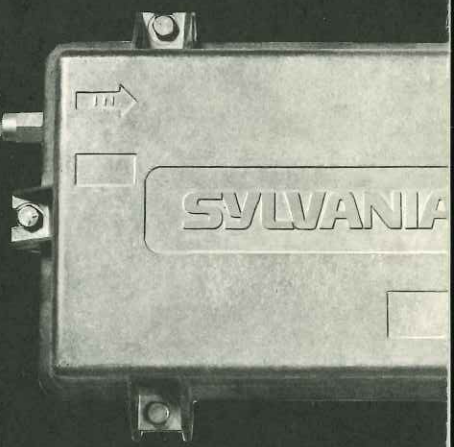
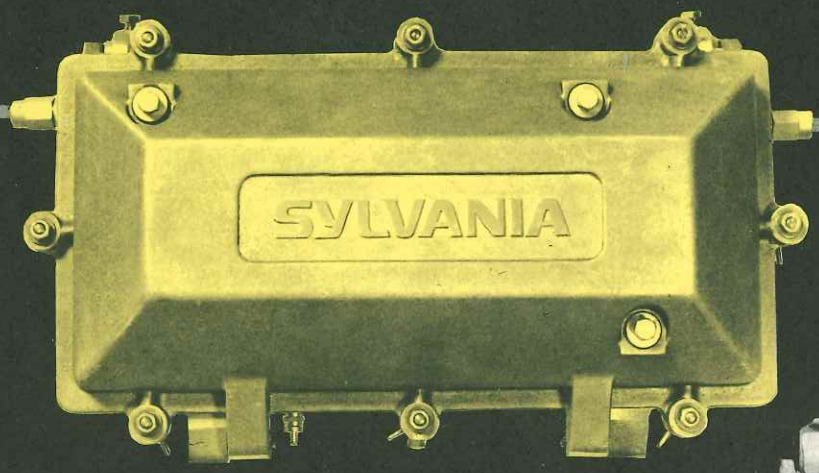
455 - FOR.220

SYLVANIA PATHMAKER CATV



Wide Spectrum Cable Communications Equipment



455/6.1

INTRODUCTION

The full potential of a wideband communications link, such as a CATV system, can only be realized with trunk and distribution equipments that are capable of performing to the exacting demands of a multi-channel, multi-service system.

By stressing a "top-quality" approach to its PATHMAKER line of CATV hardware, Sylvania has taken a firm step in ensuring that its equipment will meet those demands. This emphasis has resulted in development of hardware that will meet the needs of the CATV industry for many years to come. This catalog briefly describes highlights of this versatile line of equipment - Sylvania PATHMAKER.

CONTENTS

Trunk Amplifier Station 1
Multi-Purpose Amplifier Station 5
Station Modules
- Trunk Amplifier Module 7
- Single-Ended Bridging Amplifier Module 8
- Single-Ended Distribution Amplifier Module 9
- Push-Pull Bridging Amplifier Module 10
- Push-Pull High Gain Distribution Amplifier Module 11
- Push-Pull Manual Distribution Amplifier Module 12
- Push-Pull Automatic Distribution Amplifier Module 13
- Total Automatic Control (TACM) Module 14
- DC Power Supply Module 15
- Output Splitter Module 16
- Diplex Filter Module 17
- Sub-VHF Amplifier Module 18

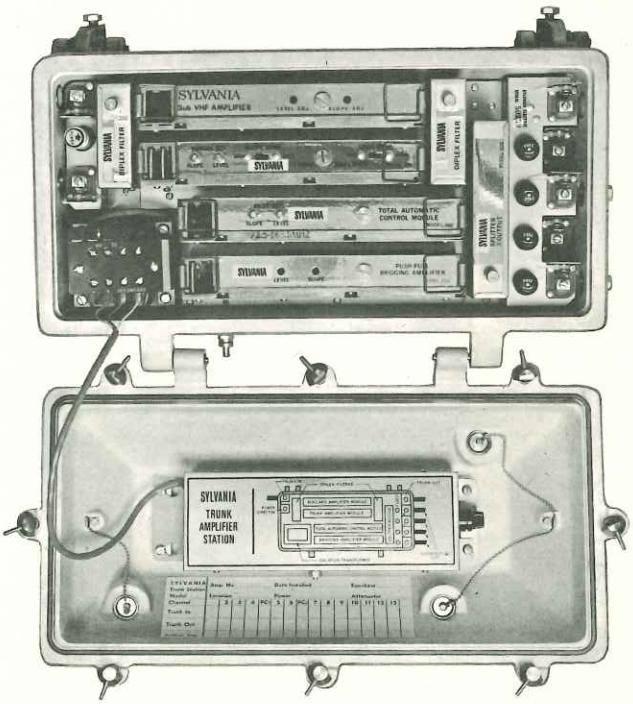
Regulated AC Power Supply (360 VA Capacity) 19
Regulated AC Power Supply (720 VA Capacity) 20
Outdoor Directional Coupler/Multi-Tap 21
Additional Passive Devices 23
Trunk Amplifier Station Equipment Complements 24
Plug-In Equalizers and Attenuation Pads 24
Multi-Purpose Amplifier Station Equipment Complements 25

No responsibility is assumed by Sylvania for use of information contained herein nor for any infringements of patents or other rights of third parties which may result from its use.

SYLVANIA PATHMAKER CATV

TRUNK AMPLIFIER STATION
Series 2000

- Modular design - permits plug-in addition of Total Automatic Control, Bridging, and any one of several unique service modules
- Extra service Module - Sub-VHF for bi-directional or long-haul forward transmission, split-band trunk, fault reporting, custom service, or redundant trunk amplifier
- Dual pilot feature of Total Automatic Control (TAC) Module assures tight level and slope control over broad temperature excursions
- Wide spectrum bandwidth - 50-270 MHz - up to 30-channel operation
- High-reliability circuit design with unique thermal conductivity provisions
- Broad level and slope control range in both manual and automatic modes affords operation at varied cable spacing
- Increased cascadability through high over load-to-noise capability
- AC Power entry port
- Many other built-in features provide unparalleled ease of installation, maintenance, and year-around, hands-off performance



DESCRIPTION

The Sylvania advanced concept Trunk Amplifier Station is a fully modular, solid-state station offering many different operating configurations for wide-spectrum cable communications services. The flexibility of the modular design permits selection of a station with standard transmission functions for present applications and provides for the ready addition of any of a number of extra services by installation of appropriate plug-in modules. State-of-the-art performance of the station affords ready application in engineering new systems and upgrading or adding onto existing systems.

Wide amplifier response coupled with high overload-to-noise capability permit station use in long amplifier cascades for 220 or 270 MHz systems. Extended level and slope control ranges provide operation at varied cable spacing for both long and short haul systems.

The housing, base plate, Trunk Amplifier Module, and DC Power Supply are common to all Trunk Amplifier Station configurations. An isolation transformer is also standard equipment. This results in reduction of spare parts inventory requirements. The DC Power Supply is of the efficient, switching-regulator type and can be operated on 30 or 60 VAC.

STANDARD TRANSMISSION FUNCTIONS

By insertion of the appropriate modules, the station will provide any of the following services:

1. Trunk amplifier manual control
2. Trunk amplifier total automatic control
3. Trunk amplifier manual control with bridging amplifier
4. Trunk amplifier total automatic control with bridging amplifier

SPECIAL SERVICE FUNCTIONS

The station will provide any of the previously listed services plus any one of the following services by insertion of an appropriate module into the "spare" module position:

1. Sub-VHF for bidirectional transmission
2. Sub-VHF for long-haul forward transmission
3. Split-band trunk (54-110 MHz and 140-270 MHz) for multiplexing of octave bandwidths
4. Fault reporting module for remote monitoring of trunk line conditions
5. Special custom amplifier for private line or special purposes
6. Redundant trunk amplifier for paralleled or "push-pull" action

STANDARD FEATURES

The base plate for the entire Trunk Amplifier Series is constructed of heavy aluminum with surface iriditing to prevent corrosion and improve RF conductivity. Required RF, AC, and DC connectors for implementing any of the various models are mounted and wired in every base plate. A center-seize connector block is used for RF cable connectors and will accommodate 0.412 to 0.750-inch coaxial cable. Located on this connector block for easy visibility and quick access is a surge protector. All mounting hardware is corrosion-proof stainless steel.

The rugged, cast aluminum housing, which is common to all station types, is equipped with quick - release cover fastenings and a weather-proofing 0-ring seal. The housing cover contains an aluminum lip which increases EMI suppression. On the side of the housing is a port which accommodates a pressure valve for pressurizing the Trunk Amplifier Station. Bosses located within the housing mate with the station modules, providing large heat sink surfaces for amplifier electronics. An external directional coupler test point is provided for monitoring trunk input without opening the station housing. An auxillary port is also available for direct AC power insertion, eliminating the need of an external power coupler.

Station Electrical and Physical Characteristic	TRUNK AMPLIFIER STATION CONFIGURATION					
	Trunk Amplifier (Manual Control) Model 2000	Trunk Amplifier/ Total Auto. Cont. Model 2020	Trunk Amplifier (Manual Control)/ Single-Ended Bridger Model 2010	Trunk Amplifier/ Total Auto Cont./ Single-Ended Bridger Model 2030	Trunk Amplifier (Manual Control)/ Push-Pull Bridger Model 2100	Trunk Amplifier Total Auto. Cont. Push-Pull Bridger Model 2110
Output Capability (Measured to NCTA Std. 002-0267)						
12 Ch.*						
Trunk						
-57 dB X-Mod	51 dBmV	51 dBmV	51 dBmV	51 dBmV	51 dBmV	51 dBmV
-93 dB X-Mod	33 dBmV	33 dBmV	33 dBmV	33 dBmV	33 dBmV	33 dBmV
Bridging						
-57 dB X-Mod	-	-	51 dBmV	51 dBmV	52 dBmV	52 dBmV
21 Ch.* (Extrapolated)						
Trunk						
-57 dB X-Mod	48 dBmV	48 dBmV	48 dBmV	48 dBmV	48 dBmV	48 dBmV
-93 dB X-Mod	30 dBmV	30 dBmV	30 dBmV	30 dBmV	30 dBmV	30 dBmV
Bridging						
-57 dB X-Mod	-	-	48 dBmV	48 dBmV	49 dBmV	49 dBmV
29 Ch.**(Extrapolated)						
Trunk						
-57 dB X-Mod	46 dBmV	46 dBmV	46 dBmV	46 dBmV	46 dBmV	46 dBmV
-89 dB X-Mod	30 dBmV	30 dBmV	30 dBmV	30 dBmV	30 dBmV	30 dBmV
Bridging						
-57 dB X-Mod	-	-	46 dBmV	46 dBmV	47 dBmV	47 dBmV
Typ. Noise Figure (Ch.13) (0 dB Equalizer) - Nom. Gain	9.0 dB	9.0 dB	9.0 dB	9.0 dB	9.0 dB	9.0 dB
Gain						
Trunk						
Nominal	23 dB	23 dB	23 dB	23 dB	23 dB	23 dB
Operating Range	17-30 dB	16-32 dB	17-30 dB	16-32 dB	17-30 dB	16-32 dB
Bridging (Maximum)	-	-	30 dB	30 dB	33 dB	33 dB
Operating Bandwidth - Trunk and Bridging	50-270 MHz	50-270 MHz	50-270 MHz	50-270 MHz	50-270 MHz	50-270 MHz
Frequency Response						
Trunk	±0.2 dB	±0.2 dB	±0.2 dB	±0.2 dB	±0.2 dB	±0.2 dB
Bridging	-	-	±0.3 dB	±0.3 dB	±0.3 dB	±0.3 dB
Level Control Range (Excluding Plug-In Pads)						
Trunk	13 dB	16 dB	13 dB	16 dB	13 dB	16 dB
Bridging	-	-	4 dB	4 dB	6.0 dB	6.0 dB
Slope Control Range (Cable Equiv.) -						
Trunk	13 dB	16 dB	13 dB	16 dB	13 dB	16 dB
Bridging	-	-	6 dB	6 dB	8 dB	8 dB
Input Level Control - Trunk and Bridging						
Plug-In Pads	0,3,6,9,12 dB					
Plug-In Equalizers (Cable Equiv. at 270 MHz)	4,7,10,13,16,19 dB					
(Cable Equiv. at 220 MHz)	5,8,11,14,17 dB					

* - Lo-Band Levels 5-dB Block Tilt; All Other Levels as Specified.

** - Lo-Band Levels 5-dB Block Tilt; Mid-Band Levels 2-dB Block Tilt; Super-Band Levels 2-dB Reverse Block Tilt; Hi-Band Levels as Specified

TRUNK AMPLIFIER STATION

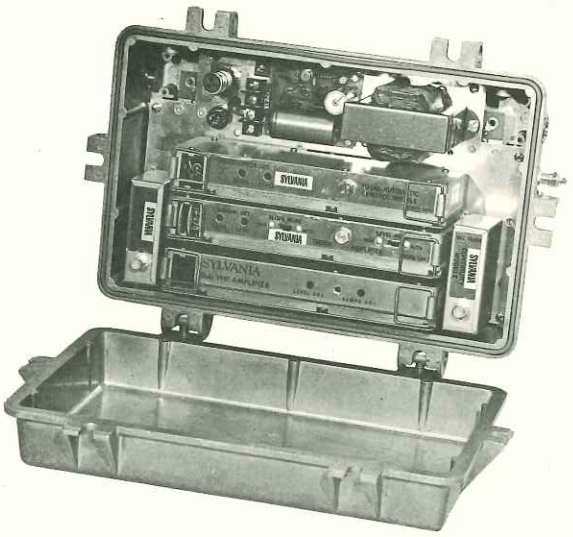
Station Electrical and Physical Characteristic	Trunk Amplifier (Manual Control) Model 2000	Trunk Amplifier/ Total Auto. Cont. Model 2020	Trunk Amplifier (Manual Control)/ Single-Ended Bridger Model 2010	Trunk Amplifier/ Total Auto. Cont./ Single-Ended Bridger Model 2030	Trunk Amplifier (Manual Control)/ Push-Pull Bridger Model 2100	Trunk Amplifier Total Auto. Cont. Push-Pull Bridger Model 2110
Return Loss						
Trunk						
In	18 dB	18 dB	18 dB	18 dB	18 dB	18 dB
Out	18 dB	18 dB	18 dB	18 dB	18 dB	18 dB
Distribution Splitter-Out	-	-	16 dB	16 dB	16 dB	16 dB
Second-Order Beat						
Trunk (33 dBmV)	-72 dB	-72 dB	-72 dB	-72 dB	-72 dB	-72 dB
Bridging (50 dBmV)	-	-	-52 dB	-52 dB	-66 dB	-66 dB
Hum Modulation - Trunk and Bridging (Below 100%)	< -66 dB	< -66 dB	< -66 dB	< -66 dB	< -66 dB	< -66 dB
Automatic Level Compensation	-	±0.2 dB Output Change for ±8 dB Input Change	-	±0.2 dB Output Change for ±8 dB Input Change		±0.2 dB Output Change for ±8 dB Input Change
Automatic Slope Compensation	-	±0.5 dB Output Slope Change For ±8 dB Input Cable Equiv. Change	-	±0.5 dB Output Slope Change For ±8 dB Input Cable Equiv. Change		±0.5 dB Output Slope Change For ±8 dB Input Cable Equiv. Change
Power Requirements						
Voltage 17-30 VAC	(AC) 1.08A	(AC) 1.12 A	(AC) 1.33A	(AC) 1.37A	(AC) 1.37A	(AC) 1.45A
33-60 VAC	(AC) 540 mA	(AC) 560 mA	(AC) 670 mA	(AC) 690 mA	(AC) 690 mA	(AC) 725 mA
DC Current	(DC) 360 mA	(DC) 400 mA	(DC) 655 mA	(DC) 690 mA	(DC) 690 mA	(DC) 725 mA
Temperature Range	-40 to +140°F					
Test Points	Directional Coupler External (Trunk Out: 30 dB Down); Direct Internal (Trunk In, Trunk Out, Bridger Out)					
Dimensions/Weight	16 1/2" Long by 8" High X 6 1/2" Deep; 25 Pounds (Approx.)					

SYLVANIA

PATHMAKER CATV

MULTI-PURPOSE AMPLIFIER STATION Series 1000

- **Modular construction with several types of removable baseplate**
- **Push-pull and single-ended modules for use as a distribution amplifier station**
- **Employs standard trunk modules for use as trunk transportation station**
- **Broad spectrum bandwith - 50-270 MHz**
- **Dual pilot control for automatic operation**
- **Extra service module for bi-directional transmission**



DESCRIPTION

The Sylvania Multi-Purpose Amplifier Station offers many different operating configurations for wide-spectrum cable communications services. Its modular construction, together with a choice of several removable baseplate designs, offers complete applications flexibility.

TRANSMISSION FUNCTIONS

Insertion of appropriate modules and baseplates allows for any of the following services:

A. Distribution Amplifier (Single Output)

1. Manual Control - Push-Pull or Single-Ended Amplifier
2. Automatic Control - Push-Pull Amplifier.
3. Sub-VHF option for Bi-Directional Transmission

B. Trunk Transportation Amplifier

1. Uses Standard Trunk Amplifier Modules for Transportation Amplifier
2. Manual or Dual-Pilot Operation
3. Bi-Directional Transmission Option

STANDARD FEATURES

The baseplate for the Multi-Purpose Amplifier Station Series is constructed of sturdy aluminum. Four baseplate versions are available, each of which contains the required RF, AC and DC connectors for implementing a specific transmission function. A center-seize connector capable of accomodating 0.412 to 0.750-inch coaxial cable is used for each RF cable connection; all connector blocks are directly attached to the housing. Baseplates may therefore be removed without disconnecting cable seizures. All baseplate-mounting screws are captive to facilitate installation and removal.

The housing is die-cast aluminum of a corrosion-resistant alloy. A conductive O-ring seal is used for weather-proofing and EMI suppression. A port is provided on the bottom of the housing for accomodation of a pressure valve. T-bolt fasteners are used for rapid opening and closure of the housing.

A variety of amplifier and automatic control modules may be used with this amplifier. These modules are powered from a DC power supply and isolation transformer which are standard to all multi-purpose amplifiers. Heat sink bosses located on the housing serve to conduct heat from the modules directly to the outside surface. By this means all electronics are sufficiently cooled to assure increased reliability and proper performance under elevated environmental temperatures. External test points are available at the side of the housing for monitoring of input and output levels.

	DISTRIBUTION AMPLIFIER STATIONS				TRUNK TRANSPORTATION STATIONS	
Station Characteristic	Push-Pull Amplifier (Manual) Model 1026	Push-Pull Amplifier With Auto. Control Model 1076	Single-Ended Amplifier (Manual) Model 1001	High-Gain Push-Pull Amplifier (Manual) Model 1027	Trunk Amplifier (Manual) Model 1010	Trunk Amplifier With Auto. Control Model 1060
Output Capability (Measured to NCTA Std. 002-0267) (-57 dB X-Mod)						
12 Channel*	51 dBmV	50 dBmV	51 dBmV	52 dBmV	51.5 dBmV	51 dBmV
21 Channel*(Extrapolated)	48 dBmV	47 dBmV	-	49 dBmV	48.5 dBmV	48 dBmV
29 Channel**(Extrapolated)	46 dBmV	45 dBmV	-	47 dBmV	46.5 dBmV	46 dBmV
Noise Figure (Ch 13) 0 dB Equalizer (Typical)	10 dB	10 dB	9 dB	9.5 dB	9.0 dB	9.0 dB
Max. Gain	26 dB	28 dB	29 dB	33 dB	30 dB	32 dB
Operating Bandwidth	50-270 MHz	50-270 MHz	50-270 MHz	50-270 MHz	50-270 MHz	50-270 MHz
Frequency Response	±0.3 dB	±0.3 dB	±0.3 dB	±0.3 dB	±0.2 dB	±0.2 dB
2nd Order Beat (2 Channels)	-66 dB at 50 dBmV Out	-65 dB at 50 dBmV Out	-52 dB at 50 dBmV Out	-65 dB at 50 dBmV Out	-73 dB at 33 dBmV Out	-72 dB at 33 dBmV Out
Input Return Loss	>16 dB	> 16 dB	> 16 dB	> 16 dB	18 dB	18 dB
Output Return Loss	>16 dB	>16 dB	> 16 dB	>16 dB	18 dB	18 dB
Hum Modulation	<-60 dB	< -60 dB	< -60 dB	< -60 dB	<-66 dB	<-66 dB
Level Control Range	3.5 dB + PIP***	PIP***Level Set	4 dB + PIP***	6.5dB+PIP***	13 dB + PIP***	16 dB + PIP***
Auto. Level Compensa.	-	8 dB	-	-	-	8 dB
Slope Control Range	4 dB Cable + PIE***	PIE***Slope Set	6 dB Cable + PIE***	8 dB Cable + PIE***	13 dB Cable + PIE***	16 dB Cable + PIE***
Auto. Slope Compensa.	-	8 dB (Cable Equiv)	-	-	-	8 dB (Cable Equiv)
Power Requirements****						
Voltage:20-30 VAC(Max.)	840 mA	910 mA	800 mA	840 mA	880 mA	920 mA
40-60 VAC(Max.)	420 mA	455 mA	400 mA	420 mA	440 mA	460 mA
DC Current	320 mA	390 mA	295 mA	325 mA	360 mA	400 mA
Temperature Range ..... -40° to+140°F Test Points ..... Input External, Output External, 30 dB Down Dimensions ..... 14"x8"x5" Weight .... 12 Pounds (Approx)						

* Lo-Band Levels 5-dB Block Tilt; All Other Levels as Specified
** Lo-Band Levels 5-dB Block Tilt; Mid-Band Levels 2-dB Block Tilt; Super-Band Levels
*** 2-dB Reverse Block Tilt; Hi-Band Levels as Specified
PIP - Plug-In Pads; PIE - Plug-In Equalizer
**** DC Power Supply provided as standard equipment with all stations

TRUNK AMPLIFIER MODULE Model No. 100

- **Bandwidth 50-270 MHz with Response Flat to ±0.2 dB**
- **13– dB Level Control Range (Manual Operation)**
- **13– dB Cable Equivalent Slope Control Range (Manual Operation)**
- **Manual or Total Automatic Control**
- **High Overload–to–Noise Capability**

DESCRIPTION

The Trunk Amplifier Module is housed in a well shielded plug-in enclosure which permits testing and adjustments to be made without effects to amplifier operation when the Amplifier Station cover is opened. Efficient thermal design is achieved through heat sinking of transistors to the module case and, in turn, to the station housing, resulting in cool operation and extended component life.

A variable attenuator with flat response provides manual output level regulation over a 13-dB range. A separate control allows for variable slope adjustment over a 13-dB cable equivalent range. Plug-in equalizers and attenuation pads are available for a wide range of input signals. Pads, equalizers, and controls are accessible without removal of the module. The slope control uses a pivot point of 220 MHz, which permits amplifier use for regular 220 MHz-band or 270 MHz-extended band. This pivot point permits alignment with standard 220-MHz CATV field test equipment.

ELECTRICAL CHARACTERISTICS

Bandwidth	40-290	MHz
Operating	50-270	MHz
Frequency Response	±0.20	dB
Noise Figure at Channel 13 (0 dB Equalizers)	8.8	dB Typ.
Gain - Operating		
Manual Control	18-31	dB
Automatic Control	17-33	dB
Nominal	24	dB
Maximum Output Capability (-57 dB Cross-Modulation at 24-dB Gain)		
NCTA 12 Channel (5 dB Block Tilt - Low-Band Channels)	51.5	dBmV
NCTA 21 Channel (5 dB Block Tilt - Low-Band Channels)(Extrapolated)	48.5	dBmV
Operating Level Cross-Modulation (33.5 dBmV Output at 24-dB Gain)		
NCTA 12 Channel (5 dB Block Tilt - Low Band Channels)	-93	dB
NCTA 21 Channel (5 dB Block Tilt - Low Band Channels) (Extrapolated)	-87	dB
Level Control Range	0-13	dB
Slope Control Range (Cable Equiv.)	0-13	dB
Input Attenuation Pads	0,3,6,9,12	dB
Equalization	0 - 32 of Cable with Slope Control and Plug-in Equalizers (at 270 MHz) of 4,7,10,13,16,19 dB Equalizers (at 220 MHz) of 5,8,11,14,17 dB	
Return Loss-Input	20	dB
Output	20	dB
Recommended Output Level	33.5	dBmV
Power Requirements	24	VDC
	~360	mA

SINGLE-ENDED BRIDGING AMPLIFIER MODULE Model No. 200

- **High Output Level**
- **Bandwidth 50–270 MHz**
- **Response Flat to ±0.3 dB**
- **Plug–In Attenuation Pad**

DESCRIPTION

The Bridging Amplifier Module is used in conjunction with the Trunk Amplifier Station and one of four different Output Splitter Modules to provide from one to four distribution outputs from the trunk. The Bridging Amplifier Module is housed in the same type of well-shielded plug-in enclosure as the Trunk Amplifier Module and provides all of the same mechanical features.

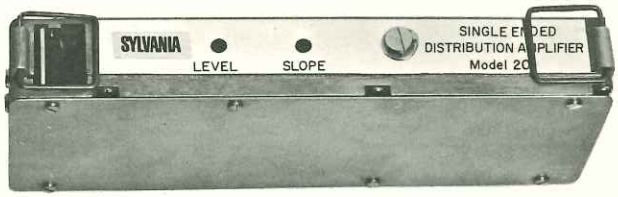
The high output capability of the Bridging Amplifier Module permits operation at a high level for long distance distribution. Output level and slope are adjustable over a wide range by means of the separate variable controls and by the plug-in attenuation pad.

ELECTRICAL CHARACTERISTICS

Bandwidth	50-270	MHz	
Frequency Response	±0.3	dB	
Gain	30	dB	Max.
Level Control Range	0-4	dB	
	Plus a Plug-In Pad		
Slope Control Range (Cable Equiv.)	0-6	dB	
Maximum Output (-57 dB Cross-Modulation per NCTA Std.)			
NCTA 12 Channel (5 dB Block Tilt - Low Band Channels)	51	dBmV	
NCTA 21 Channel (5 dB Block Tilt - Low Band Channels)(Extrapolated)	48	dBmV	
Noise Figure at Channel 13	<9.0	dB Typ.	
Output Return Loss	> 16	dB	
Power Requirements	24	VDC	
	~290	mA	

SINGLE-ENDED DISTRIBUTION AMPLIFIER MODULE Model No. 201

- **High Output Level**
- **Bandwidth 50-270 MHz**
- **Response Flat to ± 0.3 dB**
- **Plug-In Attenuation Pad and Equalizer**



DESCRIPTION

The Distribution Amplifier Module is used in conjunction with the Multi-Purpose Amplifier Station to provide a single output distribution amplifier. It can be used for termination of a trunk line or for amplification on feeder lines (line extender). The module is housed in the same type of well-shielded plug-in enclosure as the Trunk Amplifier Module and provides the same mechanical features.

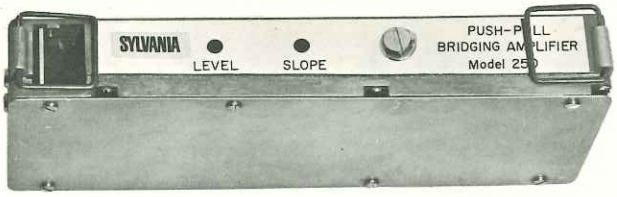
The high output capability of the Bridging Amplifier Module permits operation at a high level for long distance distribution. Output level and slope are adjustable over a wide range by means of the separate variable controls and by the plug-in attenuation pad and equalizer.

ELECTRICAL CHARACTERISTICS

Bandwidth	50-270 MHz
Frequency Response	±0.3 dB
Gain	30 dB Max.
Level Control Range	0-4 dB Plus a Plug-In Pad
Slope Control Range (Cable Equiv.)	0-6 dB Plus a Plug-In Equalizer
Maximum Output (-57 dB Cross-Modulation per NCTA Std.)	
NCTA 12 Channel (5 dB Block Tilt - Low Band Channels)	51 dBmV
NCTA 21 Channel (5 dB Block Tilt - Low Band Channels)(Extrapolated)	48 dBmV
Noise Figure at Channel 13	9.0 dB Typ.
Output Return Loss	16 dB
Power Requirements	24 VDC 290 mA

PUSH-PULL BRIDGING AMPLIFIER MODULE Model No. 250

- **Increased Output Capability**
- **Reduced Second – Order Distortion**
- **Increased Gain**
- **Bandwidth 50–270 MHz**
- **Plug–In Attenuation Pad**



DESCRIPTION

The "push-pull" Bridging Amplifier Module has the same mechanical features as the single-ended Bridging Amplifier Module. It is used in the Sylvania Trunk Amplifier Station when operation requires higher distribution signal levels.

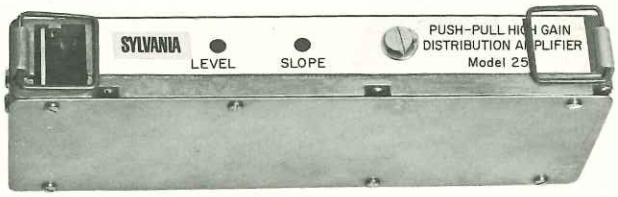
The "push-pull" circuitry serves to reduce all second-order intermodulation products to levels that make an extended spectrum system with higher signal levels realizable. This permits system operation at high levels for carriage of channels in addition to the standard VHF television channels. These channels may be placed in the spectrum between 120-174 MHz and 216-270 MHz.

ELECTRICAL CHARACTERISTICS

Bandwidth	50-270 MHz
Frequency Response	±0.3 dB
Gain	33 dB Max.
Level Control Range	6.5 dB
	Plus a Plug-In Pad
Slope Control Range (Cable Equiv.)	8 dB
Second-Order Distortion (50 dB mV Out)	>-65 dB
Maximum Output (-57 dB Cross-Modulation per NCTA Std.)	
NCTA 12 Channel (5 dB Block Tilt - Low Band Channels)	52 dBmV
NCTA 21 Channel (5 dB Block Tilt - Low Band Channels(Extrapolated)	49 dBmV
Noise Figure at Channel 13	< 9 dB Typ.
Output Return Loss	>16 dB
Power Requirements (Supplied by Trunk Amplifier Station)	24 VDC at 350 mA

PUSH-PULL HIGH GAIN DISTRIBUTION AMPLIFIER MODULE Model No. 251

- **Increased Output Capability**
- **Reduced Second - Order Distortion**
- **Increased Gain**
- **Bandwidth 50-270 MHz**
- **Plug-In Attenuation Pad and Equalizer**



DESCRIPTION

The Push-Pull High Gain Distribution Amplifier Module is used in conjunction with the Multi-Purpose Amplifier Station to provide a single output distribution amplifier. The module is housed in the same type of well-shielded plug-in enclosure as the Trunk Amplifier Module and provides the same mechanical features.

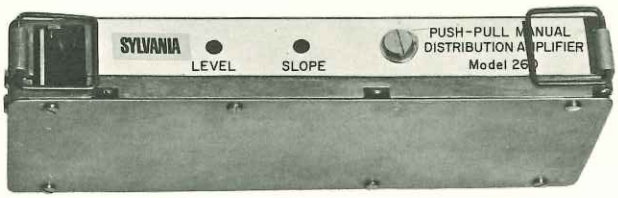
The Model 251 Amplifier Module employs "push-pull" circuitry to minimize second-order distortion at higher operating levels; this higher output capability permits more subscribers to be fed from a single amplifier. Output level and slope are adjustable over a wide range by means of the separate variable controls and the plug-in attenuation pad and equalizer.

ELECTRICAL CHARACTERISTICS

Bandwidth	50-270 MHz
Frequency Response	±0.3 dB
Gain	33 dB Max.
Level Control Range	6.5 dB Plus a Plug-In Pad
Slope Control Range (Cable Equiv.)	8 dB Plus a Plug-In Equalizer
Second-Order Beat (50 dB mV Out)	> -65 dB
Maximum Output (-57 dB Cross-Modulation per NCTA Std.)	
NCTA 12 Channel (5 dB Block Tilt - Low Band Channels)	52 dBmV
NCTA 21 Channel (5 dB Block Tilt - Low Band Channels) (Extrapolated)	49 dBmV
Noise Figure at Channel 13	< 9 dB Typ.
Output Return Loss	> 16 dB
Power Requirements	24 VDC at 350 mA

PUSH-PULL MANUAL DISTRIBUTION AMPLIFIER MODULE Model No. 260

- **Bandwidth to 270 MHz**
- **Low Second-Order Distortion**
- **High Output Capability**
- **Plug-In Attenuation Pad and Equalizer**



DESCRIPTION

The Push-Pull Manual Distribution Amplifier Module is used in conjunction with the Multi-Purpose Amplifier Station to provide a single output distribution amplifier. This distribution amplifier can be used for termination of a trunk line or for amplification on feeder lines (line extender). The module is housed in the same type of well-shielded plug-in enclosure as the Trunk Amplifier Module and provides the same mechanical features.

The Model 260 Amplifier Module utilizes "push-pull" circuitry to minimize second-order distortion at high operating levels. Because of its high output capability this module can be operated at high feeder levels, thus permitting more subscribers to be fed from a single amplifier. The high output capability, together with extended frequency response, also allows up to three of the Model 260 Amplifier Modules to be cascaded after a bridging amplifier.

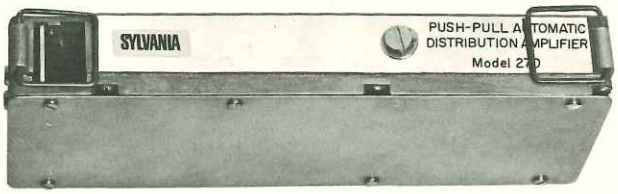
Plug-in attenuation pads and equalizers, together with a 3.5-dB, variable level control range and 4-dB cable equivalent slope range, permit the module to be used for equalizing varied combinations of cable and flat loss.

ELECTRICAL CHARACTERISTICS

Bandwidth	50-270 MHz
Frequency Response	±0.3 dB
Level Control Range	0-3.5 dB
	Plus a Plug-In Pad
Slope Control Range (Cable Equiv.)	0-4.0 dB
	Plus a Plug-In Equalizer
Noise Figure at Channel 13 (0 dB Equalizer)	< 10 dB Typ.
Gain	> 26 dB Max.
Output Capability (-57 dB X-Mod at 24-dB Gain)	
NCTA 12 Channel (5-dB Block Tilt - Low-Band Channels)	51 dBmV
NCTA 21 Channel (5-dB Block Tilt - Low-Band Channels)(Extrapolated)	< 48 dBmV
Second-Order Beat (at 50 dBmV Out)	<-66 dB
Return Loss-Input	> 17 dB
Return Loss-Output	> 17 dB
Power Requirements	320 mA at-24 VDC

PUSH-PULL AUTOMATIC DISTRIBUTION AMPLIFIER MODULE Model 270

- **Bandwidth to 270 MHz**
- **Low Second-Order Distortion**
- **High Output Capability**
- **Used for Automatic Control of Distribution Levels**



DESCRIPTION

The Automatic Push-Pull Distribution Amplifier Module is used in conjunction with TACM Module Model No. 300 in the Multi-Purpose Amplifier Station to provide dual-pilot automatic control of levels on distribution (feeder) lines. The module is housed in the same type of well-shielded plug-in enclosure as the Trunk-Amplifier Module and has the same mechanical features.

The Model No. 270 Amplifier Module utilizes "push-pull" circuitry in order to minimize second-order distortion at high operating levels. Its variable level and slope are controlled by DC levels from the auxiliary Total Automatic Control Module Model 300. Additional level and slope control is provided by plug-in attenuation pads and equalizers.

ELECTRICAL CHARACTERISTICS (In Automatic Mode)

Bandwidth	50-270 MHz
Frequency Response	±0.3 dB
Noise Figure at Channel 13 (0 dB Equalizer)	<10 dB Typ.
Gain	29 dB Max.
Level Control Range	8 dB Plus a Plug-In Pad
Slope Control Range (Cable Equivalent)	8 dB Plus a Plug-In Equalizer
Output Capability (-57 dB X-Mod at 24 dB Gain)	
NCTA 12 Channel (5-dB Block Tilt - Low Band Channels)	51 dBmV
NCTA 21 Channel (5-dB Block Tilt - Low Band Channels)(Extrapolated)	48 dBmV
Second-Order Beat (at 50 dBmV Out)	-66 dB
Return Loss - Input	16 dB
Return Loss - Output	16 dB
Power Requirements	350 mA at -24 VDC

TOTAL AUTOMATIC CONTROL MODULE (TACM) Model No. 300

- **Dual Pilot Carrier Total Control System**
- **Wide Automatic Level Control Range of 16 dB**
- **Wide Automatic Slope Control Range of 16–dB Cable Equivalent**
- **Adaptable to Any Two Pilot Carrier Frequencies in the 50–270 MHz Band**
- **Stable Operation Over Wide Temperature Range**

DESCRIPTION

The Total Automatic Control Module, when added to an Amplifier Station, provides total automatic level and slope control to compensate for wide system level variations due to changes in cable and equipment temperature. This module is housed in the same type of well-shielded plug-in enclosure as the Trunk Amplifier Module and provides all of the same mechanical features.

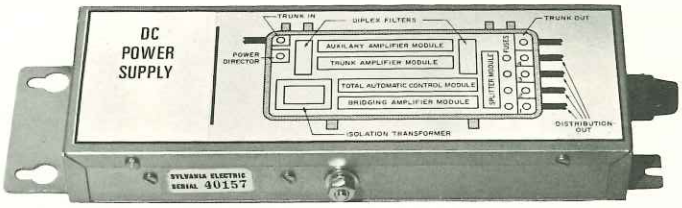
This unique module employs two pilot carriers to sense, reference, and control both ends of the frequency spectrum. The standard pilot carrier frequencies are 73.0 MHz and 163.5 MHz, though any frequencies in the 50-270 MHz band may be chosen. Through use of the Total Automatic Control Module, Trunk Amplifier Station output level is maintained to within ±0.20 dB over an input level excursion of 16 dB. This permits operation over the extreme ambient temperature range of -40 to +140°F. Narrow band filtering of the RF signals assures that the controls will respond only to the pilot carriers.

ELECTRICAL CHARACTERISTICS

Automatic Level Compensation	±0.20 dB Output Change For ±8 dB Input Change
Automatic Slope Compensation (Cable Equiv.)	±0.5 dB Output Change For ±8 dB Input Change
Pilot Carrier Frequencies	73.0 and 163.50 MHz or as Selected
Power Requirements	24 VDC at 40 mA
Recommended Trunk Line Pilot Levels	10 dB Down From Most Adjacent Carrier Level

DC POWER SUPPLY MODULE Model No. 400

- **Highly Efficient Switching Regulator**
- **Temperature–Compensated Regulation**
- **Low Ripple on DC Output**
- **30 or 60 VAC Operation**



DESCRIPTION

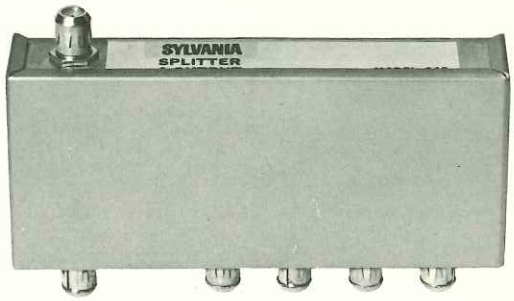
The Sylvania Trunk Amplifier Station DC Power Supply maintains DC current regulation over a 30-60 VAC input range and over a 1-ampere DC load change. Regulated current supply capacity is in excess of that required by a complete Multi-Capability Trunk Amplifier Station. The switching-type regulator provides high transfer efficiency of power, thus reducing the number of AC power supplies and AC power costs required by a system. A post-regulation filter limits all types of noise and ripple to extremely low levels. A temperature-compensated zener reference and internal compensation maintain DC voltage constant within ±0.2 volt over a wide temperature range. The DC Power Supply operates in conjunction with an efficient isolation transformer, which can be wired for 30 or 60 VAC operation, and is contained within a case attached to the inside of the station housing cover.

ELECTRICAL CHARACTERISTICS

Input Voltage	17-30	VAC
	33-60	VAC
Output Voltage	24	VDC
Output Current	1.1	A Max.
Output Voltage Regulation		
Load Regulation	±0.5 VDC for Output Load Change From 150 mA to 1 A DC	
Line Regulation	±0.5 VDC For Input AC Voltage Change From 33 to 60 VAC or 17 to 30 VAC	
Ripple (120 Hz and Switching Frequency)	< .2	mV P-P
Efficiency (Full Operating Station)	80%	at Max. Current

OUTPUT SPLITTER MODULE 600 Series

- **Low VSWR**
- **Low–Loss Hybrid Circuitry**
- **Bandwidth 50–270 MHz**
- **Provisions for from One to Four Separate Feeder Lines**
- **Highly Isolated Outputs**



DESCRIPTION

The Output Splitter Module, housed within the station, is used with the Bridging Amplifier Module to provide distribution of signals to one to four separate feeder lines. Well-designed hybrid circuitry provides low-loss, well-isolated power division. The 50-270 MHz bandwidth of the splitter complements the wide spectrum capability of the Trunk Amplifier Station.

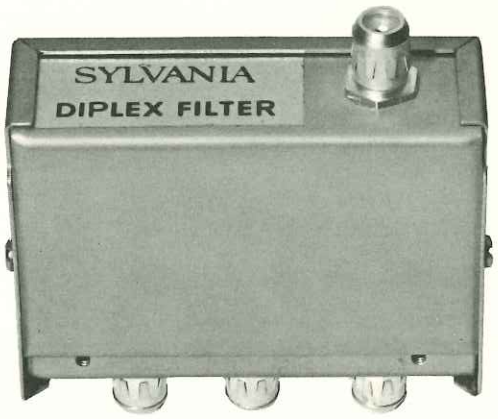
Model No.	Service
610	1-Way Splitter
620	2-Way Splitter
630	3-Way Splitter
640	4-Way Splitter

ELECTRICAL CHARACTERISTICS

Bandwidth	50–270 MHz	
Isolation	20 dB	Min.
Return Loss		
Output	20 dB	Min.
Input	20 dB	Min.
Through Loss		
4-Way	7 dB	Max.
3-Way	3.5 dB (One Port)	Max.
	7 dB (Others)	Max.
2-Way	3.5 dB	Max.
1-Way	None	

DIPLEX FILTER MODULE Model No. 750

- **Pair Used With Each Trunk Amplifier Station**
- **Diplexes Frequency Bands of 5–30 MHz and 50–300 MHz**
- **Low Differential Delay Distortion at Band Edges**
- **Low VSWR at All Ports**
- **Ripple in Response ≤0.06 dB Ensures Cascadability**
- **High Skirt Selectivity Assures Stability of Amplifier System**



DESCRIPTION

The Diplex Filter Module is contained within a well shielded case which plugs into the amplifier housing baseplate. It is a three-port device which serves to direct through filtering signals in the bands of 5-30 MHz and 50-300 MHz from either a common port to separate ports or from separate ports to one common port.

The Diplex Filter is used together with the Trunk Amplifier Module (50-270 MHz) and the Sub-VHF Amplifier Module to make either a frequency division multiplexed, two-band forward transmission system or a two-band bidirectional transmission system.

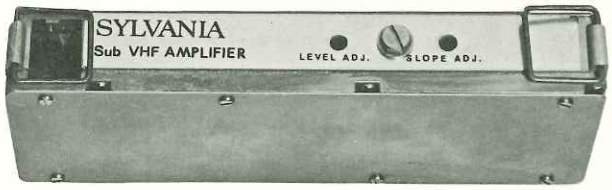
The characteristics of the diplex filter are such that, when mated with the appropriate amplifiers, differential delay distortion and response characteristics are kept to values which permit cascading of more than 40 filters. In addition, skirt selectivity is made sharp enough to ensure that, in the bi-directional mode of operation, loop stability is maintained with sufficient margin when amplifiers are at maximum gain. The high skirt selectivity also ensures that multiple signal paths will not cause echo effect, perturbation in response characteristics, or smearing of TV picture content edges.

ELECTRICAL CHARACTERISTICS

Bandwidth		
Low Pass		5-30 MHz
High Pass		50-300 MHz
Insertion Loss		< 0.3 dB
Ripple		< ±0.1 dB
VSWR (75 Ohms Imp.)		< 1.15 In Pass Bands
Isolation Between Bands		> 55 dB
Differential Group Delay		
High Band - Channel 2		< 3.4 Nanosec/3.6 MHz
Low Band -	24-30 MHz	< 5.5 Nanosec/3.6 MHz
	18-24 MHz	< 3.8 Nanosec/3.6 MHz

SUB-VHF AMPLIFIER MODULE Model No. 1650

- **Bandwidth 5–32 MHz ±0.2 dB**
- **Low Input and Output VSWR**
- **Fixed Equalization of 15 dB Cable Equivalent**
- **Variable Equalization of 7 dB**
- **Available for Forward or Reverse Direction**
- **Used Every Other Trunk Station**
- **Used Together with Diplex Filter Pair**



DESCRIPTION

The Sub-VHF Amplifier Module, when used together with diplex filters in an Amplifier Station, provides additional channel carriages in the trunk system. These additional channels can occupy an operational band between 6-30 MHz. Depending on the Sub-VHF Amplifier used, the channel carriage can be for either additional long-haul forward transmissions or for reverse-type transmission. Together with the Trunk Amplifier Module, the latter results in frequency-division multiplexed, bidirectional transmission over a single cable.

This module is housed in the same type of well-shielded plug-in enclosure as the Trunk Amplifier Module. It therefore provides for the same type of mechanical features as in the Trunk Amplifier Module.

Extra attention is given to achieving low input and output VSWR of 1.15 dB in order to assure that reflection situations leading to "ghosting" do not occur.

In order to minimize the number of amplifiers used in a system, the maximum amplifier gain at 40 MHz is set to 23 dB so that one sub-VHF amplifier can be used for every two trunk amplifiers. Wide range of gain (7 dB) and equalizer controls (7 dB) permits the amplifier to accomodate a wide range of cable spacings.

ELECTRICAL CHARACTERISTICS

Bandwidth	5-32 MHz ± 0.2	dB
	Roll-off at 42 MHz > 40	dB
Gain - Nom.	20	dB
Max.	23	dB
Control	7	dB(+Plug-In Pad)
Equalization - Fixed	15	dB
Variable	7	dB
VSWR (75 Ohms Imp.)In	1.15 Max. Pass Band	
Out	1.15 Max. Pass Band	
Noise Figure	< 10 dB Typ.	
Output Capability		
(-57 dB Cross Modulation per NCTA Std.)	57	dBmV
(-81 dB Cross Modulation per NCTA Std.)	81	dBmV
Second-Order Distribution (2 Channel Beat)	<-60 dB at 40	dBmV
Power Requirements	<120 mA at 24	VDC

SYLVANIA
PATHMAKER CATV

REGULATED AC POWER SUPPLY – Models 3300, 3301

- **360 VA Capacity**
  30 VAC at 12A
  60 VAC at 6A
- **Superior Regulation**
- **Vacuum Impregnated Transformer**
- **Options: Power Coupler, Primary Lightning Arrestor**

DESCRIPTION

The Sylvania Model 3300 Regulated AC Power Supply unit is designed specifically to convert 115-volt commercial power to a suitable voltage for energizing CATV systems employing solid-state equipment. Superior regulation is achieved by a ferroresonant regulating transformer. The output voltage is maintained within tight limits over a wide range of operating current and line voltage variations.

The power supply is thoroughly protected against both lightning induced surge voltages and overloads. The output is protected by a gas discharge device and the input (Model 3301) by a film type arrestor. Damage from overload is prevented by a primary circuit breaker and by the ferroresonant action within the power transformer which limits the output current to a safe value.

The housing is constructed of heavy-gauge aluminum with a white, baked enamel finish. The design gives excellent protection against the entry of precipitation. Additionally, the power transformer is vacuum impregnated for further protection against the elements. Screened louvers in the sides and bottom provide ventilation while inhibiting the entry of foreign matter.

The supply may be conveniently mounted on pole or cross-arm. Mounting is facilitated by a removable power transformer sub chassis.

To combine the AC power with the RF directly at the AC source, the Power Supply can be equipped with optional power coupler Sylvania Model 03-1049, which installs within the power supply.

SPECIFICATIONS

Input	95-130V, 60 Hz, Single Phase
Output (Max.)	12 A at 30 VAC 6 A at 60 VAC
Line Regulation	±1%, 95-130 VAC
Load Regulation	±2% for 1/3 to Full Load
Operating Temperature Range	-40°F to $+140^{\circ}$F
Operating Humidity	98% RH Maximum
Dimensions (Approx.)	14" x 14 " x 7"
Weight (Approx.)	43 Pounds

SYLVANIA

PATHMAKER CATV

REGULATED AC POWER SUPPLY – Models 3310, 3311

- **720 VA Capacity**
  60 VAC at 12 A
- **Superior Regulation**
- **Vacuum Impregnated Transformer**
- **Options: Power Coupler, Primary Lightning Arrestor**

DESCRIPTION

The Sylvania Model 3310 Regulated AC Power Supply unit is designed specifically to convert 115-volt commercial power to a suitable voltage for energizing CATV systems employing solid-state equipment. Superior regulation is achieved by a ferroresonant regulation transformer. The output voltage is maintained within tight limits over a wide range of operating current and line voltage variations.

The power supply is thoroughly protected against both lightning induced surge voltages and overloads. The output is protected by a gas discharge device and the input (Model 3311) by a film type arrestor. Damage from overload is prevented by a primary circuit breaker and by the ferroresonant action within the power transformer which limits the output current to a safe value.

The housing is constructed of heavy-gauge aluminum with a white, baked enamel finish. The design gives excellent protection against the entry of precipitation. Additionally, the power transformer is vacuum impregnated for further protection against the elements. Screened louvers in the sides and bottom provide ventilation while inhibiting the entry of foreign matter.

The supply may be conveniently mounted on pole or cross-arm. Mounting is facilitated by a removable power transformer sub chassis.

To combine the AC power with the RF directly at the AC source, the Power Supply can be equipped with optional power coupler Sylvania Model 03-1049, which installs within the power supply.

SPECIFICATIONS

Input	95-130V, 60 Hz, Single Phase
Output (Max.)	12A at 60 VAC
Line Regulation	±1%, 95-130 VAC
Load Regulation	±2% for 1/3 to Full Load
Operating Temperature Range	-40°F to +140°F
Operating Humidity	98% RH Maximum
Dimensions (Approx.)	14" x 14" x 7"
Weight (Approx.)	61 Pounds

SYLVANIA
PATHMAKER CATV

OUTDOOR DIRECTIONAL COUPLER / MULTI-TAP Series 3200

- **Wide Frequency Response–5-300 MHz**
- **Low Insertion Loss**
- **Up To Eight Subscriber Taps Available**
- **Plug-In Splitter Plate**

DESCRIPTION

The Sylvania Outdoor Directional Coupler/Multi-Tap is contained within a weatherproof, cast aluminum housing with provision for either strand or pedestal mounting. It accomodates standard 5/8-24 center-seized coaxial cable fittings for the through trunk line and type F connectors for subscriber feed lines. Splitter plates may be inserted after installation of the multi-tap housing.

ELECTRICAL CHARACTERISTICS

Bandwidth
- Through Line ..... 5-300 MHz
- Tap ..... 5-300 MHz

Directional Coupler Tap Value (dB)	Max. Insertion Loss (dB) 5 MHz	60 MHz	210 MHz	300 MHz	Min. Directivity (dB) (Directivity = Isolation - Tap Value) 5 MHz	60 MHz	210 MHz	300 MHz	VSWR (dB) In and Out - 5-300 MHz
Terminating	-	-	-	-	-	-	-	-	> 20
3.5	3.5	3.5	3.5	3.8	20	20	20	20	> 20
6.0	1.9	1.9	2.0	2.2	12	28	18	15	> 20
8.0	1.4	1.25	1.25	1.6	12	28	18	15	> 20
10.0	1.25	1.0	1.0	1.3	12	28	18	15	> 20
12.0	0.7	0.6	0.6	1.0	12	28	18	15	> 20
16.0	0.5	0.4	0.4	0.6	12	28	18	15	> 20
20.0	0.3	0.3	0.3	0.5	12	28	18	15	> 20
24.0	0.3	0.3	0.3	0.5	12	28	18	15	> 20
28.0	0.3	0.3	0.3	0.5	12	28	18	15	> 20
32.0	0.3	0.3	0.3	0.5	12	28	18	15	> 20

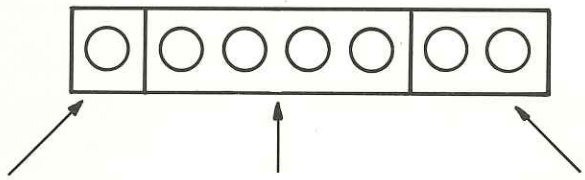
Splitter Service	Loss (db)	VSWR All Ports	Isolation Between Ports (db)
2-Way	3.5 Max.	< 1.2:1 Max.	> 25
4-Way	7.0 Max.	< 1.2:1 Max.	> 25
8-Way	10.5 Max.	< 1.2:1 Max.	> 25

PHYSICAL CHARACTERISTICS

Input/Output Port Connectors.. 5/8-24 Threaded, Center-Seized Conductor
Feed Line Connectors ..... Type F
Dimensions ..... 5-1/16" Long, 4-5/16" High, 3" Deep

ORDERING INFORMATION

Specify the manner in which the Multi-Tap will be mounted plus the desired splitter service and tap values as illustrated below.



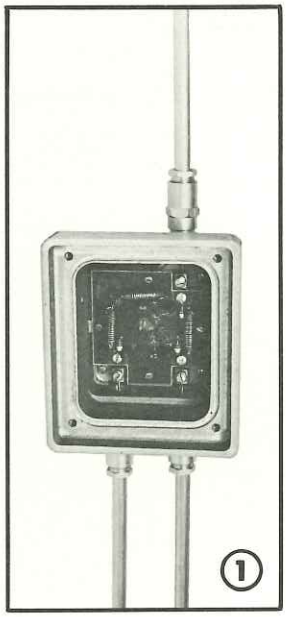
P - Pedestal Mount
S- Strand Mound

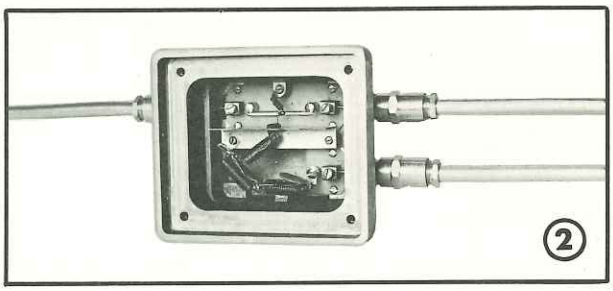
Splitter Service
3202 (2-Way)
3204 (4-Way)
3208 (8-Way)

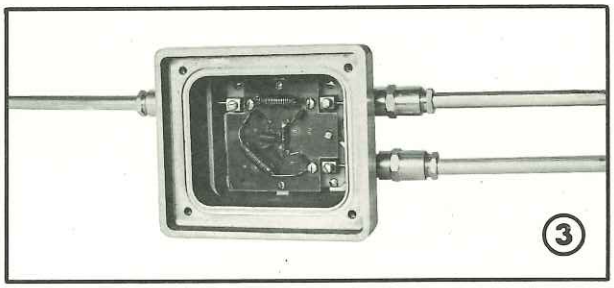
Tap Value (dB)
3.5 16
6.0 20
8.0 24
10 28
12 32

SYLVANIA
PATHMAKER CATV

ADDITIONAL PASSIVE DEVICES







1. OUTDOOR DIRECTIONAL COUPLER
Model No. 3600

- Contained in weatherproof housing
- Seized center conductor
- Bandwidth 5-300 MHz
- Strand or pedestal mount
- High Directivity with Power Passing
- Low VSWR - 5-300 MHz

2. POWER COUPLER
Model No. 3400

- Contained in weatherproof housing
- No response perturbations 5 - 270 MHz
- Low VSWR - 5-270 MHz
- High RF Isolation to AC line
- Strand or pedestal mount

3. OUTDOOR SPLITTER
Model No. 3500

- Contained in weatherproof housing
- Seized center conductor
- Bandwidth 5-300 MHz
- Strand or pedestal mount
- Low VSWR - 5-300 MHz

SYLVANIA TRUNK AMPLIFIER STATION EQUIPMENT COMPLEMENTS

	TRUNK AMPLIFIER STATION CONFIGURATION*						
Modules/Equipment Model Nos.	Model No. 2000	Model No. 2010	Model No. 2020	Model No. 2030	Model No. 2100	Model No. 2110	Sub-VHF Model
Trunk Amp. Module 100	X	X	X	X	X	X	X
DC Power Supply Module 400	X	X	X	X	X	X	X
Base Plate 500	X	X	X	X	X	X	X
Continuity Module 700 (2/Station)	X	X	X	X	X	X	
Housing 800	X	X	X	X	X	X	X
Single Ended Bridging Amp. Module 200		X		X			OPTIONS*
Push-Pull Bridging Amp. Module 250					X	X	
Total Automatic Control Module (TACM) 300			X	X		X	
Output Splitter Module (One of Following) 610: 1-Way Splitter 620: 2-Way Splitter 630: 3-Way Splitter 640: 4-Way Splitter		X		X	X	X	
Diplex Filter Module 750 (2/Station)							X
Sub-VHF Amplifier Module 1650							X

*The Stations may be ordered with any indicated combination of these services. All items marked "X" under a given station configuration are required to provide the services shown.

PLUG-IN EQUALIZERS AND ATTENUATION PADS
(For Trunk Amplifier and Multi-Purpose Amplifier Stations)

Model No.	Description	Model No.	Description
	Module Plug-In Equalizers (Cable Equiv. at 220 MHz)		Module Plug-In Attenuation Pads
922-0	0 dB	950-0	0 dB
922-5	5 dB	950-3	3 dB
922-8	8 dB	950-6	6 dB
922-11	11 dB	950-9	9 dB
922-14	14 dB	950-12	12 dB
922-17	17 dB		
	(Cable Equiv. at 270 MHz)		
927-0	0 dB		
927-4	4 dB		
927-7	7 dB		
927-10	10 dB		
927-13	13 dB		
927-16	16 dB		
927-19	19 dB		

MULTI-PURPOSE AMPLIFIER STATION EQUIPMENT COMPLEMENTS

Modules/Equipment Model No's.	MULTI-PURPOSE AMPLIFIER STATION CONFIGURATION*							
	Push-Pull Man'l. Dist. Model 1026	Push-Pull Auto. Dist. Model 1076	Single-Ended Man'l. Dist. Model 1001	Hi-Gain Push-Pull Man'l. Dist. Model 1027	Trunk Man'l. Transportation Model 1010	Trunk Auto. Transportation Model 1060	Sub - VHF Model	
							Man'l.	Auto.
Continuity Module 700 (2/Station)	X	X	X	X	X	X		
Housing 820	X	X	X	X	X	X	X	X
Base Plate								
520	X		X	X	X			
525		X				X		
530							X	
535								X
Single-Ended Dist. Amp. Module 201 (Man'l.)			X				Any of listed amp. modules may be selected for Sub-VHF service. Use base plate 530 for man'l amps. Use base plate 535 for auto. amps.	
Push-Pull High Gain Dist. Amp. Module 251 (Man'l.)				X				
Push-Pull Man'l. Dist. Amp. Module 260	X							
Push-Pull Auto. Dist. Amp. Module 270		X						
Trunk Amp. Module 100 (Man'l. or Auto.)					X	X		
Total Auto. Control Module (TACM) 300		X				X		X
Diplex Filter Module 750 (2/Station)							X	X
Sub-VHF Amp. Module 1650							X	X

*The Stations may be ordered with any indicated combination of these services. All items marked "X" under a given station configuration are required to provide the services shown.

For further information on Pathmaker distribution equipment, contact:

R. W. Pawley
Product Marketing Manager-CATV
CATV Operations
GTE Sylvania Incorporated
Seneca Falls, New York 13148

July 1971

GTE SYLVANIA
INCORPORATED

-1S2-7/71

Printed in U.S.A.